



**December 2012**

**GENERAL USE LEVEL DESIGNATION FOR BASIC TREATMENT  
CONDITIONAL USE LEVEL DESIGNATION FOR ENHANCED, AND  
PHOSPHORUS TREATMENT**

**For**

**BaySaver Technologies, Inc. BayFilter™**

**Ecology's Decision:**

**1. Based on BaySaver Technologies' application submissions, Ecology hereby issues a General Use Level Designation (GULD) for the BayFilter™.**

- **As a stormwater treatment device for Basic treatment (TSS) removal.**
- **The Basic Treatment GULD is for both the BayFilter Cartridge (BFC) and Enhanced Media Cartridge (EMC) and limited to the following maximum flow rates:**

**a. BFC Cartridge maximum flow rate of 0.7 gpm/sf**

- **30 gpm (0.067 cfs) per cartridge (43 sf filter area)**
- **26-inches in diameter and approximately 28.75-inches tall.**

**b. EMC Cartridge maximum flow rate of 0.5 gpm/sf**

- **45 gpm (0.1 cfs) per cartridge (30-inch diameter) (90 sf filter area)**
- **75 gpm (0.17 cfs) per cartridge (39-inch diameter) (150 sf filter area)**

**c. Media combinations for the BayFilter cartridges are limited to Silica Sand, Perlite, Zeolite, and Activated Alumina. (All filters are limited to 19-inch vertical component to the spiral filter layers)**

**2. Based on BaySaver Technologies' application submissions, Ecology hereby issues a conditional use level designation (CULD) for the BayFilter™ cartridges.**

- **As a stormwater treatment device for Enhanced treatment (dissolved Cu and dissolved Zn removal) and Phosphorus treatment.**
- **Sized at a design rates no greater than those listed above (GULD (Basic) Flow rates).**

3. Ecology approves use of BayFilter™ Cartridges using the Silica Sand, Perlite, Zeolite, and Activated Alumina for treatment at the above flow rates per cartridge. Designers shall calculate the water quality design flow rates using the following procedures:
  - Western Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
  - Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
  - Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.
4. The CULDs expire on December 1, 2013 unless extended by Ecology, and are subject to the conditions specified below.
5. The GULD has no expiration date, but it may be amended or revoked by Ecology, and is subject to the conditions specified below.

**Ecology's Conditions of Use:**

**BayFilter™ units shall comply with these conditions:**

1. Design, assemble, install, operate, and maintain BayFilter™ units in accordance with BaySaver Technologies' applicable manuals and documents and the Ecology Decision.
2. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured filter treatment device.
  - Typically, BaySaver designs BayFilter Cartridge systems for a target filter media replacement interval of 12 months.
  - Testing results provided to Ecology for the Basic GULD approval indicate that the treatment system required maintenance after four months of operation. Ecology used the effluent flow rate decreasing to below the design flow rate as the indicator of the need for maintenance. Ecology determined this from the continuous flow monitoring data. This interval does not necessarily determine the maintenance frequency for all BayFilter systems.

- Owners/operators must inspect BayFilter systems for a minimum of twelve months from the start of post-construction operation to determine site-specific maintenance schedules and requirements. Owners/operators must conduct inspections monthly during the wet season, and every other month during the dry season. (According to the SWMMWW, the wet season in western Washington is October 1 to April 30. According to SWMMEW, the wet season in eastern Washington is October 1 to June 30.) After the first year of operation, owners/operators must conduct inspections based on the findings during the first year of inspections.
  - Conduct inspections by qualified personnel, follow manufacturer's guidelines, and must use methods capable of determining either a decrease in treated effluent flowrate and/or a decrease in pollutant removal ability.
3. When inspections are performed, the following findings typically serve as maintenance triggers:
    - Accumulated vault sediment depths exceed an average of 2 inches, or
    - Accumulated sediment depths on the tops of the cartridges exceed an average of 0.5 inches, or
    - Standing water remains in the vault between rain events.
    - Bypass during storms smaller than the design storm.
    - Note: If excessive floatables (trash and debris) are present, perform minor maintenance consisting of gross solids removal, not cartridge replacement.
  4. The filter fabric used in the BayFilter is highly oleophilic (oil absorptive); therefore, hydrocarbon accumulation on the filter may cause premature failure. Oil control BMP's should be installed upstream of BayFilter installations if warranted, and/or the BaySaver should be inspected after any known oil spill or release.
  5. BaySaver Technologies Inc. commits to submitting a QAPP for Ecology approval by June 1, 2012 that meets the TAPE requirements for attaining a GULD for enhanced and phosphorus treatment. The monitoring site(s) chosen should be reflective of the product's treatment intent. Baysaver shall monitor sites prior to installation of the canister to ensure concentrations of the monitored constituents are within TAPE guidelines.
  6. BaySaver Technologies Inc. shall complete all required testing and submit a TER for enhanced and phosphorus treatment for Ecology review by April 30, 2013.
  7. BaySaver Technologies Inc. may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.
  8. Discharges from the BayFilter™ units shall not cause or contribute to water quality standards violations in receiving waters.

**Applicant:** BaySaver Technologies Inc.  
**Applicant's Address:** 1030 Deer Hollow Drive  
Mount Airy, MD, 21771

**Application Documents:**

- *Technical Evaluation Report BayFilter System, Grandview Place Apartments, Vancouver, Washington and Appendices A through O (May 18, 2011)*
- *Washington State Department of Ecology Technology Assessment Protocol – Environmental BayFilter™ Conditional Use Designation Application (March 2007)*
- *BaySaver Technologies, Inc. BayFilter™ System Washington State Technical and Design Manual, Version 1.1 (December 2006)*
- *Efficiency Assessment of BaySeparator and Bay filter Systems in the Richard Montgomery High School January 6.2009.*
- *Evaluation of MASWRC Sample Collection, Sample Analysis, and Data Analysis, December 27, 2008*
- Letter from Mid-Atlantic Stormwater Research Center to BaySaver Technologies, In. dated October 22, 2009.
- Letter from Mid-Atlantic Stormwater Research Center to BaySaver Technologies, In. dated November 5, 2009.
- Maryland Department of the Environment letter to BaySaver Technologies dated Jan. 13, 2008 regarding approval of BayFilter as a standalone BMP for Stormwater treatment.
- NJCAT letter to BaySaver Technologies dated June 18, 2009 regarding Interim Certification.

**Applicant's Use Level Request:**

- General use level designation as a basic, enhanced, and phosphorus treatment device in accordance with Ecology's Stormwater Management Manual for Western Washington.

**Applicant's Performance Claims:**

- Removes and retains 80% of TSS based on laboratory testing using Sil-Co-Sil 106 as a laboratory stimulant.
- Removes 42% of dissolved Copper and 38% of dissolved Zinc.
- Expected to remove 50% of the influent phosphorus load.

## **Ecology's Recommendations:**

Ecology finds that:

- Ecology should provide BaySaver Technologies, Inc. with the opportunity to demonstrate, through additional laboratory and field-testing, whether the BayFilter™ system (as a single treatment facility) can attain Ecology's Enhanced Treatment and Phosphorus removal goals.

## **Findings of Fact:**

- Based on field testing in Vancouver, WA, at a flow rate less than or equal to 30 gpm per canister, the BayFilter™ system demonstrated a total suspended solids removal efficiency of greater than 80% for influent concentrations between 100 and 200 mg/l and an effluent concentration < 20 mg/l for influent concentration < 100 mg/l.
- Based on laboratory testing, at a flowrate of 30 GPM per filter, the BayFilter™ system demonstrated a total suspended solids removal efficiency of 81.5% using Sil-Co-Sil 106 with an average influent concentration of 268 mg/L and zero initial sediment loading.
- Based on laboratory testing, at a flowrate of 30 GPM per filter, the BayFilter™ system demonstrated a dissolved phosphorus removal efficiency of 55% using data from the Richard Montgomery High School field-testing. The average influent concentration was 0.31 mg/L phosphorus and zero initial sediment loading.
- Based on data from field-testing at Richard Montgomery High School in Rockville, MD the BayFilter system demonstrated a Cu removal efficiency of 51% and 41% for total and dissolved Cu respectively. Average influent concentrations are 41.6 µg/l total and 17.5 µg/l dissolved.
- Based on data from field-testing at Richard Montgomery High School in Rockville, MD the BayFilter system demonstrated a Zn removal efficiency of 45% and 38% for total and dissolved Cu, respectively. Average influent concentrations are 354 µg/l total and 251 µg/l dissolved, respectively.

## **Other BayFilter™ Related Issues to be Addressed By the Company:**

1. The Washington State field test results submitted in the TER do not yet show whether the BayFilter™ system can reliably attain 30% removal of dissolved Cu, 60% removal of dissolved Zn, or 50% removal of Total Phosphorus found on local highways, parking lots, and other high-use areas at the design operating rate.
2. BaySaver Technologies, Inc. should test a variety of operating rates to establish conservative design flow rates.
3. The system should continue to be monitored to measure bypass and to calculate if the system treats 91% of the volume of the total annual runoff volume.

4. The system should be tested under normal operating conditions, such that the settling basin is partially filled with pollutants. Results obtained for “clean” systems may not be representative of typical performance.
5. Conduct field-testing at sites that are indicative of the treatment goals.
6. BaySaver should continue monitoring the system for a longer period to help establish a maintenance period and to obtain data from additional qualified storms. Conduct testing to obtain information about maintenance requirements in order to come up with a maintenance cycle.
7. Conduct loading tests on the filter to determine maximum treatment life of the system.
8. Conduct testing to determine if oils and grease affect the treatment ability of the filter. This should include a determination of how oil and grease may affect the ion-exchange capacity of the system if claims are to be made for phosphorus removal.
9. BaySaver should develop easy-to-implement methods of determining when a BayFilter system requires maintenance (cleaning and filter replacement).
10. BaySaver must update their O&M documents to include information and instructions on the “24-hour draw-down” method to determine if cartridges need replacing.

**Technology Description:**

Download at [www.BaySaver.com](http://www.BaySaver.com)

**Contact Information:**

Applicant:

Tom Pank  
BaySaver Technologies, Inc.  
1030 Deer Hollow Drive  
Mount Airy, MD, 21771  
(301) 829-6470  
[tpank@baysaver.com](mailto:tpank@baysaver.com)

Applicant website:

[www.BaySaver.com](http://www.BaySaver.com)

Ecology web link:

<http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html>

Ecology:

Douglas C. Howie, P.E.  
Department of Ecology  
Water Quality Program  
(360) 407-6444  
[douglas.howie@ecy.wa.gov](mailto:douglas.howie@ecy.wa.gov)

**Revision History**

<b>Date</b>	<b>Revision</b>
April 2008	Original use-level-designation document
February 2010	Revision
August 2011	GULD awarded for Basic Treatment
April 2012	Maintenance requirements updated.
August 2012	Revised design storm criteria
December 2012	Revised contact information and document formatting